SECTION 206 - BITUMINOUS MAT PAVEMENT

1. GENERAL

When so specified in this section, materials, equipment and construction shall conform to the 1990 Edition of the Standard Specifications for State Road and Bridge Construction as published by the Kansas Department of Transportation, hereinafter referred to as the "Standard Specifications." Construction of bituminous mat base course, and surfacing consists of laying a hot plant mixed bituminous paving mixture of designated thickness on the previously constructed subgrade, or on new bituminous base. Materials shall be heated and mixed in a central plant and shall be hot when laid and compacted. Equipment shall be standard type suitable for the purpose and subject to approval.

2. PREPARATION OF SUBGRADE AND BASE

Earth subgrade shall be prepared as specified in the Section 102, entitled "Excavation and Embankment." New bituminous base shall be prepared by the removal of all loose particles, mud, dirt, and other foreign material to as clean a condition as is practicable; cleaning shall be done by the use of power brooms or other equivalent and approved methods; flushing with water shall be done as directed.

3. TACK COAT

Each lift of bituminous mat base course, which will be covered, by another lift of bituminous mat, shall receive a bituminous tack coat. Material shall be Type SS-1H anoxic asphalt emulsion as specified in Section 1202 of the "Standard Specifications." Material shall be sampled and tested by an approved testing laboratory at the expense of the Contractor and acceptance will be based on certified test results, as specified for bituminous material in mat. Equipment and construction requirements shall conform to Section 603 of the "Standard Specifications." Rate of application shall be as directed by the Engineer and shall be between 0.05 and 0.15 gallon per square yard.

4. BITUMINOUS MATERIALS

The bituminous material in mat shall be Grade AC-5 asphalt cement as specified in Section 1201 of the "Standard Specifications." Material shall be sampled and sealed at the refinery or other point of loading, and an approved testing laboratory shall test samples. All sampling and testing shall be conducted in accordance with the applicable AASHO or ASTM test method. Acceptance will be based on certified test reports, and copies of such reports shall be furnished for each shipment. Contractor shall arrange and pay for all testing, and shipment of materials shall be scheduled to permit sampling and testing in advance of time materials will be required on the work.

5. HEATING BITUMINOUS MATERIAL

Asphalt cement shall be preheated and applied to the aggregate at approved temperatures within the range of 275 to 325 degrees F., and in no case shall temperatures exceed 350 degrees F. Any over-heated material shall be set aside and not used until it has been resampled and retested; conditions of acceptance shall be the same as under original tests. Steam coils used for heating bituminous materials shall be absolutely tight to prevent leakage of steam or moisture. Direct fire heating will be permitted provided heater is designed to provide positive flow of bitumen through heater and heater is equipped with thermostatic control to shut off fire when material is heated to any predetermined

temperature.
Use of any method of heating which introduces free steam or moisture into bitumen will not be permitted.

6. MINERAL AGGREGATES

Aggregates for use in base course shall conform to the requirements of Section 1103 of the "Standard Specifications;" shall be Type BM-4; and shall consist of crushed stone, crushed gravel, sand and/or chat, and a mineral filler. Aggregates for use in surface course shall conform to the requirements of Section 1103 of the "Standard Specifications;" shall be Type BM-2; and shall consist of crushed stone, sand and mineral filler. Materials shall be sampled and tested by an approved testing laboratory at the expense of the Contractor and acceptance will be based on certified test results, as specified above for bituminous material.

7. CENTRAL MIXING PLANT

The central mixing plant shall be an approved type of pugmill or rotary drum, equipped with weight-batch hoppers or orifice feed from each bin for controlling accurately the amount of each separate aggregate or mineral filler to be incorporated in the mix. Equipment shall provide for heating aggregate and bituminous material to definite predetermined temperatures and shall be designed to mix intimately the bituminous material with aggregates at rates directed by the Resident Inspector within the limits of five to eight percent. Mixing shall continue until mixture has a uniform color, is thoroughly coated, and is free from oil boils. Central mixing plant shall be similar to that specified in the "Standard Specifications." Any hot mix plant which is used to furnish material for this project and is located anywhere within an area established by boundaries located three (3) miles beyond the existing city limits of any city shall be equipped with an approved wet dust collector.

A. Preparation of Mineral Aggregate. Aggregate for mixture shall be heated and dried before entering mixer. Aggregate shall be screened to specified sizes and conveyed to separate bins ready for mixing with bituminous materials. Filler shall be weighed or otherwise proportioned and added to aggregate at mixing plant. Spreading filler over tops of aggregate piles or dumping it into hoppers at crushing plants will not be permitted.

B. Preparation of Bituminous Mixtures. Prepared aggregates shall be accurately measured and conveyed into the mixer in proportionate amounts of each aggregate required to meet specified grading. Specified amount of bituminous material for each batch shall be introduced into the mixer. Aggregate and bitumen shall be mixed for at least 30 seconds or longer as necessary to coat all particles thoroughly. In no case shall aggregate be introduced into mixture at a temperature more than 25 degrees F. above temperature of bituminous material. All overheated or carbonized mixture shall be rejected.

8. TRANSPORTATION AND DELIVERY OF HOT BITUMINOUS MIXTURE

Mixture shall be transported from plant to point of use in pneumatic-tired vehicles having tight bodies previously cleaned of all foreign materials. Inside surface of each vehicle may be lubricated lightly with thin oil or soap solution prior to loading, but excessive use of lubricant or use of gasoline, kerosene, or similar products will not be permitted. Material shall be weighed, then delivered and dumped into hopper of a self-propelled

power machine for placing and spreading material as hereinafter specified. During transportation of hot bituminous mixtures from remote central mixing plant to point of usage and placement on the prepared subgrade or base course, trucks shall be provided with tarpaulin covers or other adequate protection to prevent undue loss of heat. In any case, temperature of mixture at time of placement shall be within the range of 275 to 325 degrees F.

9. PLACING HOT BITUMINOUS MIXTURE

Bituminous mixture shall be placed in layers of not more than four (4) inch compacted thickness. New and existing concrete surfaces against which the bituminous base and surfacing courses are to be placed, shall receive a fog coat of bituminous material, as specified for tack coat, immediately prior to application of bituminous mixture. Surfaces shall be swept clean with power broom accompanied by power blower or hand sweeping. Equipment for spreading, shaping and finishing bituminous paving mixture shall consist of an approved self-contained power machine utilizing an integral electronic automatic control system and suitably equipped and operated to obtain a finished course of proper depth, grade and surface. Speed of machine shall be regulated so that the surface of pavement is smooth, and that the pavement is at required grade and depth and conforming to designated profile and cross section. Mixture shall be placed in strips approximately ten (10) feet wide. After first strip has been compacted, second strip shall be placed, and rolling shall include at least one (1) foot of first strip. Where use of spreading machine is impractical, mixture may be spread by hand; mixture shall be dumped on approved dump boards outside area to be paved, then spread with hot shovels and rakes into a loose layer of such depth that, when compacted, it will finish at required grade and thickness.

10. COMPACTION OF BITUMINOUS MAT

While mixture is still hot, it shall be compacted by rolling with self-propelled three (3) wheel rollers weighing not less than ten (10) tons or by tandem rollers weighing not less than eight (8) tons. Rolling shall begin as soon after spreading as the mat will bear the roller without undue displacement or hair cracking. Rolling shall start longitudinally at extreme sides of lanes and proceed toward the center of the pavement, overlapping on successive trips by at least one-half the width of rear wheel of roller. Alternate trips of roller shall be of slightly different lengths. Mixture shall be subjected to diagonal rolling, crossing lines of first trips. Motion of roller shall at all times be slow enough to avoid displacement of mixture. Any displacement occurring as a result of reversing direction of roller, or from any other cause, shall be corrected by use of rakes and fresh mixture applied when required. Sufficient rollers shall be furnished to handle output of plant adequately. Rolling shall be continued until all roller marks are eliminated and a density of at least 95 percent of theoretical maximum density has been obtained. Final rolling shall be done with tandem rollers. All compaction rolling shall be completed prior to the mixture cooling to a temperature less than 185 degrees F. Theoretical maximum density shall be calculated by the following formula:

$$\text{Theoretical Density} = \frac{100\ (62.4)}{\frac{\%\ \text{Min. Aggr. by Wt.}}{\text{Sp. Gr. Min. Aggr.}} + \frac{\%\ \text{Asphalt by Wt.}}{\text{Sp. Gr. Bitumen}}}$$

To prevent adhesion of mixture to roller, wheels shall be kept properly moistened, but an excess of water or oil will not be permitted. Rollers shall be kept in good condition and

shall be operated by competent and experienced roller operators. In all places not accessible to the roller, the mixture shall be compacted by hot hand tampers weighing not less than 25 pounds and with a tamping face area of not more than 50 square inches. Skin patching on an area that has been rolled will not be permitted. Any mixture that becomes mixed with foreign material or in any way defective shall be removed, replaced with fresh mixture and compacted to specified density.

11. JOINTS

All joints shall present the same texture, density and smoothness as other sections of the course. Placing of any course shall be as nearly continuous as possible. Rollers shall pass over unprotected end of freshly laid mixture only when laying of the course is to be discontinued. In such cases, provisions shall be made for proper bond by cutting back the joint to expose an even, vertical surface for full thickness of the course. Exposed edges shall be given a light paint coat of cutback asphalt. Fresh mixture shall be raked against joints, thoroughly tamped and rolled.

12. SMOOTHNESS TESTS

Finished surface of bituminous pavement shall not vary more than 1/4-inch when measured by a 10-foot straight-edge applied parallel to the centerline. Tests for conformity with specified crown and grade shall be made immediately after initial compression and any variation shall be corrected by removing or adding materials and continuing rolling. After completion of final rolling, smoothness shall again be checked, and irregularities that exceed specified tolerances or that retain water on the surface shall be corrected by removing defective work and replacing with new material or by adding additional material.

13. RECYCLED MATERIAL

Up to 50 percent Reclaimed Asphalt Pavement (RAP) may be substituted, if approved by the Engineer, for virgin aggregates and asphalt cement specified in paragraph 4 and paragraph 6 of this Section. The type and source of the RAP shall be identified by the Contractor and approved by the Engineer. Care shall be taken, when stockpiling, to separate and label RAP by source. The material shall be free of contamination and uniform in composition. Marshall tests; other tests to determine type or quality of RAP aggregates and asphalt cement; and mix designs shall be submitted to the Engineer for approval. The Contractor shall arrange for and pay the extra costs incurred for all testing of RAP material.